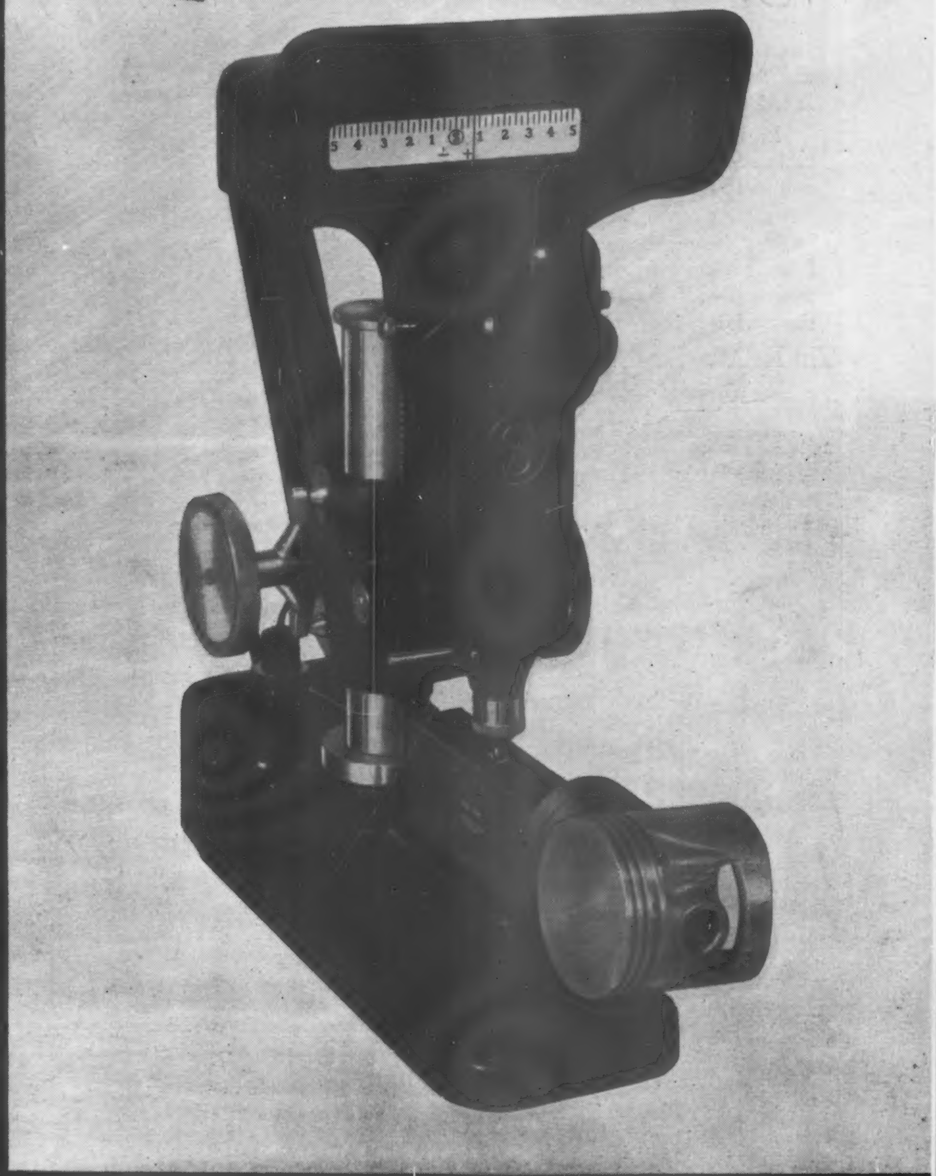
The Tool Engineer



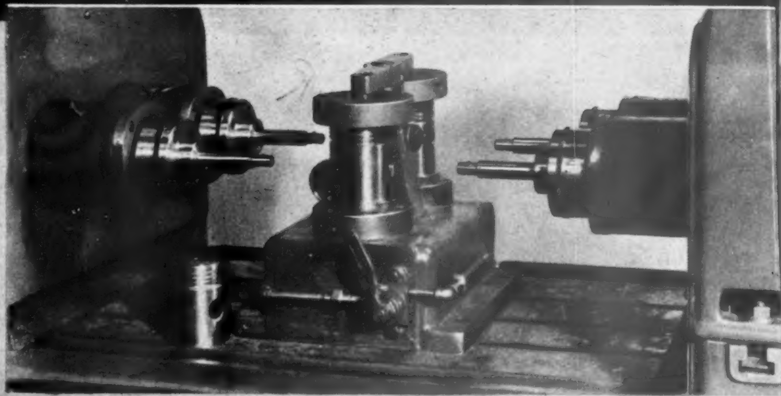
ASTE

JUMPS GAPS at HIGH SPEED
... No Loss of Time Cutting Air!

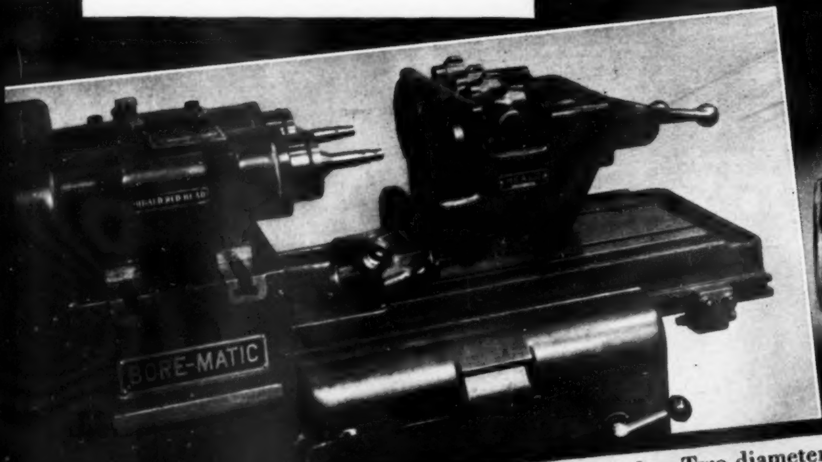
THE Heald hydraulic system and controls used on Heald Bore-Matics permit practically any table cycle desired making these machines universal and adaptable to whatever operation is to be performed.

In borizing the parts shown, the table not only brings the work up to and away from the tool at high speed, but after slowing to proper feed for boring, *jumps the gap* between the bored surfaces; thus, the tool is cutting practically *all of the time* except when the work is being loaded and unloaded.

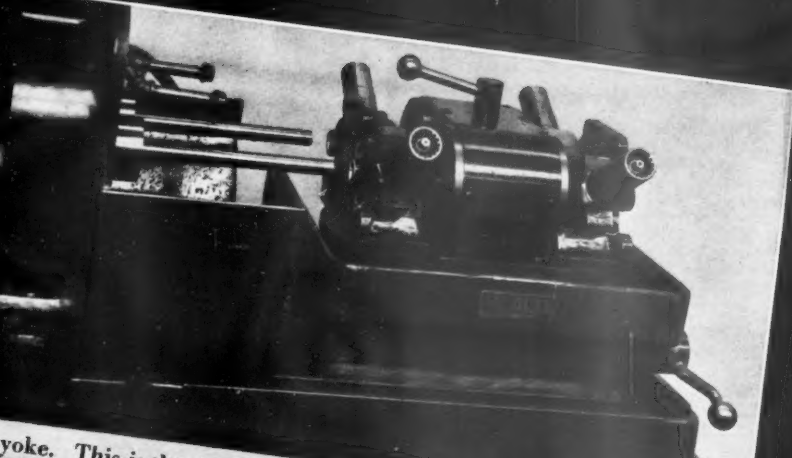
The HEALD MACHINE COMPANY
Worcester, Mass., U.S.A.



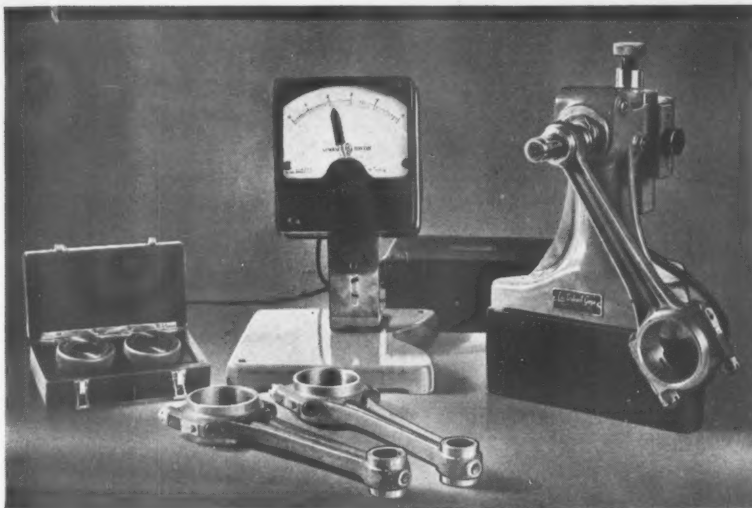
Drilled wrist pin holes are rough bored with left hand tools while right hand tools finish.



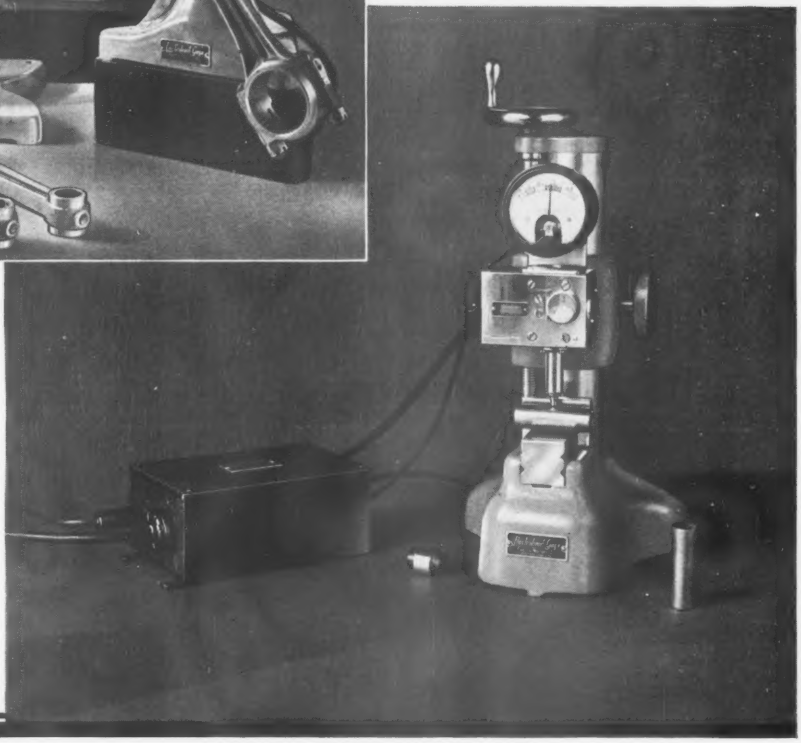
Borizing cross holes in shock absorber body. Two diameter holes are held in absolute alignment.



Borizing cross holes in universal joint yoke. This is the third machine ordered for this work.



LEFT—*The P&W Electrolimit Gage used as an Internal Comparator to check the Wrist Pin Holes in automotive connecting rods.*



RIGHT—*Inspecting Automotive Wrist Pins to "tenths" with a P&W Standard 4" Electrolimit External Comparator.*

There is practically no limit to the inspection uses to which the P&W Electrolimit Gage can be adapted. Magnifications up to ten thousand to one are readily available.

The AUTOMOTIVE INDUSTRY & P & W ELECTROLIMIT GAGE

Send for this valuable Book

FOR accurate and speedy inspection of automotive parts, either internal or external measurements, there is no better method than that offered by the P&W Electrolimit Gage . . . Industry's most successful inspection tool.

Whatever your inspection problem may be the P&W Electrolimit Gage can be adapted to successfully and accurately do the job more easily and more quickly.

Pratt & Whitney Gage Engineers are always available to assist you in solving any inspection or gaging problem. As manufacturers of gages incorporating electrical, mechanical and optical principles we are prepared to furnish the right gage for your particular inspection problem. Write our nearest branch office or direct to our factory at Hartford, Connecticut.

PRATT & WHITNEY CO.
HARTFORD, CONNECTICUT

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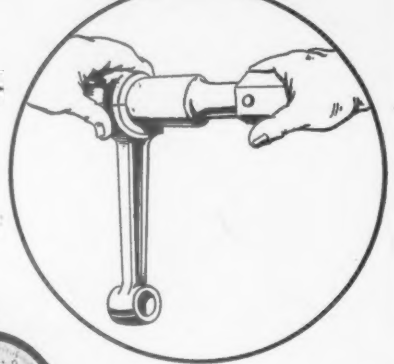
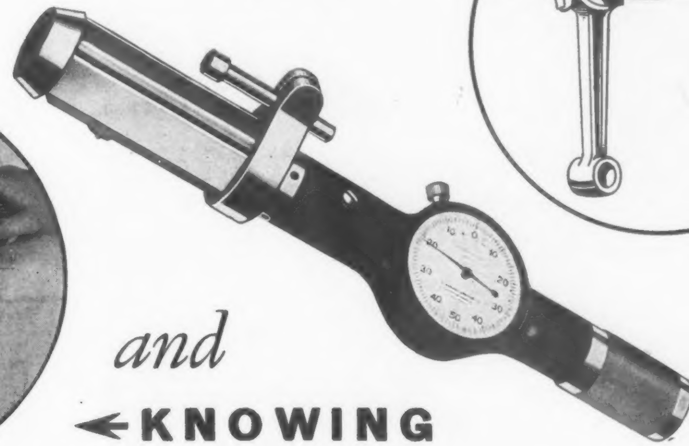
The Difference Between

GUESSING →





and

← KNOWING

Illustrating some of the many parts now being measured with the "Standard" Dial Plug Gage.

. . . is the difference between using old-fashioned plug gages and the modern "STANDARD" dial plug

No human being can *feel* the difference in bore diameters to the thousandth part of an inch.

Yet a stepped-up demand for greater accuracy in modern production calls for just this kind of precision—in fact was the reason why "Standard"—a leader in precision measuring devices—concentrated its research on the problem and pioneered the development of the Dial Plug Gage.

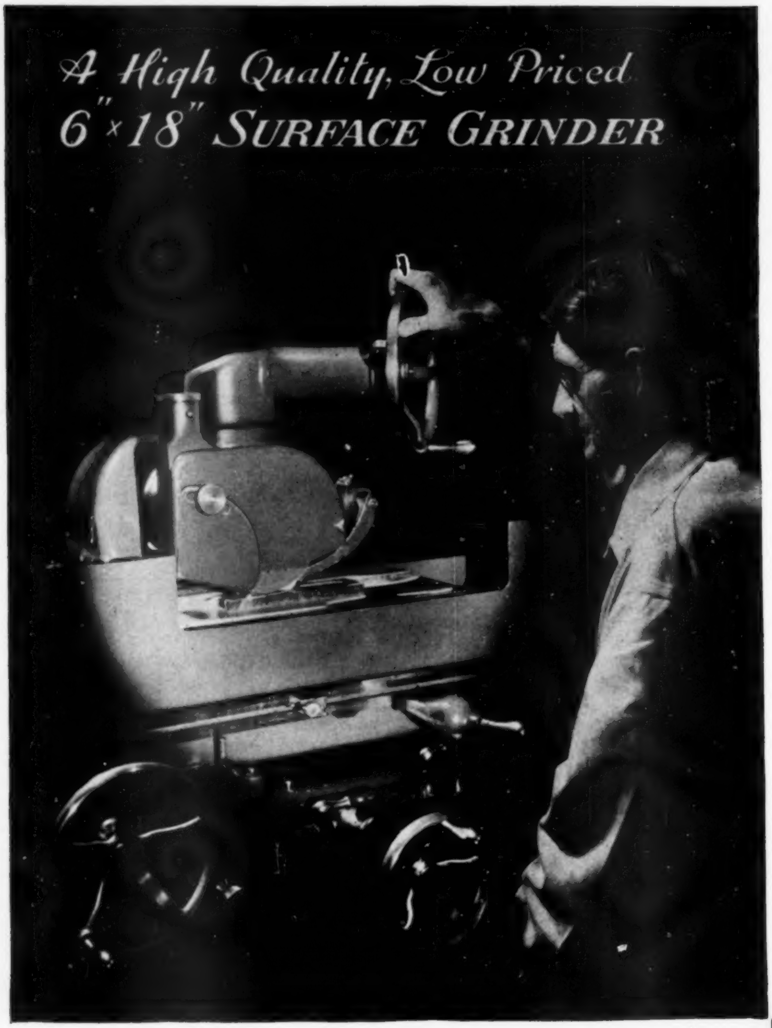
This new gage—even in the hands of unskilled labor—measures bores within .0001″ on a production basis. The piece to be measured is self-aligned before the work comes in contact with the indicating point. Measurements are taken which indicate instantly any tapered, bell mouth or out-of-round condition over the full length of the bore. And every measurement is made with respect to the axis of the bore with the diameter indicated on its true center line.

What a difference between this precise information visibly indicated on the "Standard" Dial and the feel of the old-fashioned "go," "no go" plug gage which at its best is only measuring high spots.

The only way the "Standard" Dial Plug Gage resembles the old-fashioned plug gage is the way it's used.

Yet in spite of the super accuracy and speed available with the "Standard" Dial Plug Gage, it is far more economical to use. LET US EXPLAIN WHY.

STANDARD GAGE COMPANY, Inc., Poughkeepsie, N. Y.



Tech

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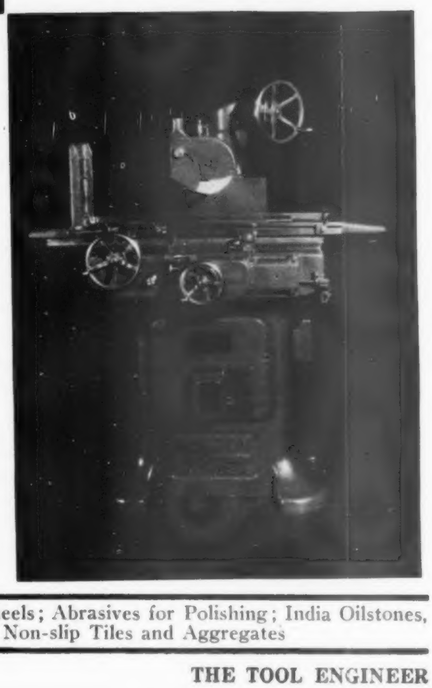
GRINDING MACHINES

BETTER quality at lower cost. That's what everyone wants today and the Norton 6″ Surface Grinder admirably meets this seeming paradox. For it "fills the bill" as no other comparable tool does. You can purchase it for either wet or dry grinding—with plain bronze or ball spindle bearings—with horizontal or vertical wheel spindle—hydraulic power or hand table traverse—automatic hydraulic or hand cross feed—with a belt or an integral motor driven spindle. And it can be converted from one arrangement to any other at any time in your own shop if you desire.



NORTON COMPANY, WORCESTER, MASS.

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√R v.4 1935/36

The Tool Engineer

Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

Vol. IV. May, 1935 No. 1

Application blanks and information pertaining to membership in the American Society of Tool Engineers may be had by addressing *The Tool Engineer,* 6432 Cass Avenue, Detroit, Michigan, or the Secretary's office, 31 Melbourne Ave., Detroit, Michigan. **Dues** are $5 initiation fee, $3 per year for senior grade membership and $2 per year for junior grade membership.

The Tool Engineer is published on the first Thursday of each month. It is the official publication of the American Society of Tool Engineers, Incorporated. The membership of the Society and readers of this publication are practical manufacturing executives such as master mechanics, works managers, tool engineers, tool designers and others who are responsible for production in hundreds of plants throughout the nation and in foreign countries.

Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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PRINCIPAL FEATURES IN THIS ISSUE

This publication is giving identity to the profession of Tool Engineering—help this cause by mentioning *The Tool Engineer* to advertisers.

MAY MEETING

(DETROIT)

HOTEL FORT SHELBY BALLROOM

May 9th, (Thursday)

NOT A DINNER MEETING

MEETING: 8:00 p.m.

Speaker: Raymond Foulkrod, Plant Extension Engineer, Michigan Bell Telephone Co.

Subject: Engineering of a Telephone Plant.

RAYMOND FOULKROD
Plant Extension Engineer
Michigan Bell Telephone Company,
Detroit

Raymond Foulkrod, Plant Extension Engineer of the Michigan Bell Telephone Company has been engaged in telephone engineering work in the Bell System for the past twenty-one years. Following graduation from the Pennsylvania State college with the class of 1914, he entered the employ of the Bell Telephone Company of Pennsylvania as a student engineer. In 1915, he was assigned to the transmisson engineering department. During the summer of 1916, he served as a private with Company B, Engineers, Pennsylvania National Guard, on the Mexican border, returning in November to the Pennsylvania Company. In 1917 he was commissioned a second lieutenant in the United States army and was sent to the Engineers' training camp, American University, Washington, D. C. He served with the 26th Engineers in France, taking part in three major offensives, and was made a first lieutenant in 1918. He returned again to the Pennsylvania Company in 1919. In December, 1920, he was transferred to the operating and engineering department, transmission engineer's division, of the American Telephone & Telegraph Company, New York and in 1927, came to the Michigan Bell Telephone Company as Transmission and Protection Engineer. He was appointed to his present position in 1928.

Post Nubulus Phoebus **(Liberal translation) "Refreshments after the meeting."**

(Refreshments are free)

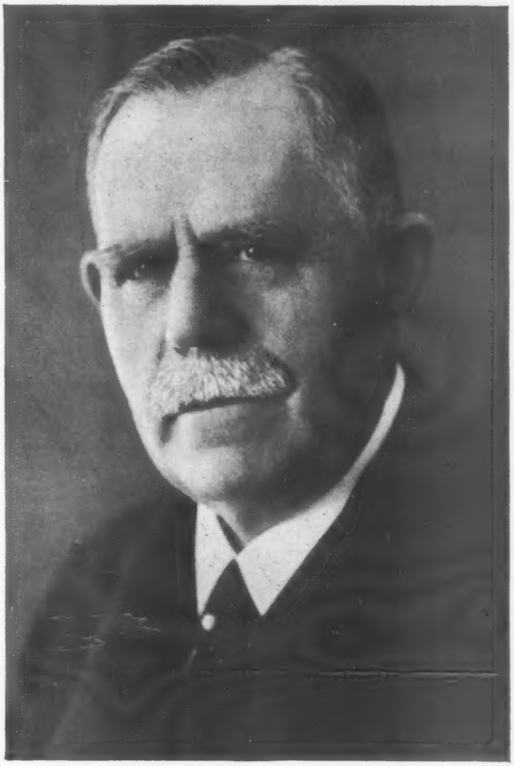
PRODUCTION PERSPECTIVES

Tool Engineers continue to be *busy*, as evidenced by the past thirty days. Detroit continues with plenty of activity in the manufacturing fields—and, from other sections come reports of increasing activities. From South Bend, we hear, the production schedule of **Studebaker** for the month of April calls for 5800 cars and trucks—an **increase of 14%** over the previous month. Production for the first two weeks in April **exceeded** the same period a year ago **by 18%.** During March, this year, Louis K. Manley, Sales Manager of the Company announced a total of **5210 cars and trucks** were **sold** and expressed optimism for the Corporation's outlook during the next few months. We also hear that the South Bend Aviation Commission **has money available** for the **development of a new airplane** there—especially a plane that can be built for $1000 or less. An invitation has been extended not only to South Bend manufacturers but to out-of-town companies or individuals who have planes now being built or plans for planes which they have been unable to finance.

From down in Connersville, Indiana we hear that Charles P. Ready, Leo J. Moran and Harry M. Moran have filed articles of incorporation under the name **Ready Machine Tool Company** for the purpose of engaging in the machine tool and die business. In Cleveland the Austin Company announces they will shortly **construct a new Diesel electric locomotive plant** for the Electro-Motive Corporation, General Motors subsidiary, **At McCook, Illinois.** This plant will be the first complete factory for the exclusive manufacture of **Diesel electric locomotives** in the country. From Providence comes news of a **new machine tool builder**—The Wells Manufacturing Company, incorporated by C. E. Adams, Henry Crowe and Thos. Hetherington. **Brown & Sharpe** claim a marked advance in a new micrometer caliper. A feature is a thimble with large figures on a non-refiecting background to facilitate reading. **R. F. Black,** formerly President of Brockway Motor Truck Corporation is now President of the **White Motor Company.** Indiana Motors Corporation, a subsidiary of the White Company announces a new Indiana Truck priced at $695—the lowest price at which White has ever built a truck—**to go into volume production May 1st.** It will appeal to a market of 750,000 buyers and will greatly enlarge the sales coverage of the White Company. **John R. Tillman** is now Chief Executive of the Bullard Company in Bridgeport. In his new capacity he will supervise all engineering departments for the Company. He was formerly in charge of Tool Engineering. **Ray Hesser,** Ford Motor, Detroit, who was reported in the February issue of *The Tool Engineer* as leaving for Japan, is now back on the job at the Rouge plant.

Probably nothing is receiving more enthusiastic interest from A.S.T.Eers and friends than the projected trip to **Cleveland in September** for the Machine Tool Builders' Exposition. Plans are now being made to charter the largest steamer on the Great Lakes to accommodate no less than one thousand A.S.T.E. members and their friends for this unusual and important event. A glorious holiday as well as an instructive and most interesting session is assured all those who attend. This *is* something to plan for *now*—as no one will want to miss it. In the meantime there will be many activities of The Society to keep A.S.T.Eers interested such as the **Annual Outing** the latter part of June or first part of July and the usual **Spring Frolic,** which will probably be held the second Thursday in June. More details will be given in the next issue of *The Tool Engineer.*

Ford Lamb, newly elected First Vice-President of A.S.T.E. and "Mayor" of Pinckney is really a country gentleman. He is now getting ready for some trout fishing and it is said he knows *where* to get 'em. How about telling *us* where you get 'em Ford? **Bill Hart** is now getting his summer home ready at Bald Mountain—he, too, is a good fisherman. **Bert Conway,** we hear, has resigned his position at Chevrolet. In the **A.S.T.E Speakers' Club,** we hear Bill Smila has dropped his debate on old-age pensions and has now turned to golf. He gave Al Sargent a good "trimming" on a recent round and now is ready to take on **Bob Lippard**—with a handicap. **Harold Johnson** is getting ready for some good fishing, too. They say he knows where to get them—"big ones"—and how to cook 'em, too. Some of our **good members in various parts of the country** have written in to Detroit headquarters, lately. Some of these letters are of special interest to members and friends in Detroit—**read these letters printed elsewhere in this issue.**



CARL EDWARD JOHANSSON

A SALUTE . . . .

To the internationally-famous inventor of the "world's standard of measurement," we pay our sincerest respect and tribute. We acknowledge his great contributions to precision measurement with the resultant interchangeability of parts and the rapid strides of progress in the field of mass production. Without these advances there would have been no profession of Tool Engineering. The following excerpt from the Encyclopedia Britannica, 12th Edition, Volume 31. indicates the far-reaching effect of Mr. Johansson's achievements:

"The decade 1910-20 saw a noteworthy development in every branch of machine-tool engineering. In no branch was the progress more marked than in instruments for precise measurements. These include types employing both physical and optical means. Their perfection has made possible the production of interchangeable parts in commercial quantities. Without means of accurate gauging the making of cheap automobiles in great numbers would be impossible. This is also true of rifles, typewriters, sewing machines and hundreds of other things made and used daily in great numbers. For accuracy and almost universal application, the gauge blocks made by C. E. Johansson, Eskilstuna, Sweden, stand high. The first combination set on his system was made in 1897, but not until 1911 was Johansson able to produce them in commercial quantities of a guaranteed quality. Subsequently these blocks became so recognized as standard that there is hardly a manufacturing plant in the world doing accurate or interchangeable metal work that has not one or more sets for reference purposes or actual use. They are also in constant use at the *National Physical Laboratory, London;* the *National Bureau of Standards, Washington;* the *Bureau International des Poids et Mesures, Paris,* and similar institutons of all the principal natons."

AN EDITORIAL

• • •

by **O. B. Jones**

SINCE this publication was first published in May, 1932, only two issues, including this one, have been devoted to a particular subject. That subject is modern gaging methods and precision measurement. *What* a subject it is—as it relates to interchangeable manufacture!

It may seem unusual that this subject should have been accorded such treatment but when it is considered that the design of a jig, tool, machine or line-up or the location of machines in the plant,—in fact everything the tool engineer does—is based upon the degree of accuracy required in the finished product it isn't surprising at all that the American Society of Tool Engineers should single out the subject for this significant treatment. Since tools have to be made to a much higher degree of accuracy than the work piece they produce it is necessary for the Tool Engineer to keep himself advised of each new discovery in the development of precision instruments and inspection methods.

This Society was organized, and its publication inaugurated, for the purpose of assembling information pertinent to tool engineering and passing it on to each member in a form for ready reference and instant review. A Standards Committee has been in operation for three years assembling information and will soon begin releasing Standard Tool Engineering Data Sheets for loose-leaf filing. Gage manufacturers, who have always cooperated one hundred per cent in supplying the Society with information, will be given further opportunities to contribute help and advice (with other manufacturers) in the development of their portion of the Tool Engineers' Standard Data Book.

Gage manufacturers, machine and tool builders, in general have contributed to the development of this Society. The Tool Engineer employed in the plant producing an article for the ultimate consumer, such as typewriters, vacuum cleaners, refrigerators, air conditioners, automobiles and a host of other mass products is apt to forget that some of the best Tool Engineers are employed in machine and tool building plants. The man who plans the production lineup is no more nor less a Tool Engineer than the man who designs and builds the individual machines which make up the line. Each must be in possession of *all* the information concerning the activities of the other before they can cooperate to the best advantage to satisfy the ultimate consumer, who, after all, is the big boss.

As we begin this fourth volume—the 37th issue—of this publication and the fourth year of activity of The Society, we are assured of a long and useful existence as an organization. The enthusiastic cooperation of all groups in the broad fields of manufacturing is responsible for the splendid growth of the American Society of Tool Engineers. It seems impossible that any group of individuals formed into a society of sympathetic workers in any field could ever have received as spontaneous, willing and vigorous assistance as we have.

The tool maker, tool draftsman, tool designer, machine designer, time-study man, and operation planner, combined into one composite individual make a Tool Engineer. Whether he is employed in the plant of the machine tool builder, or small tool manufacturer, or in the plant which uses the machine tool and its accessory equipment or is on the road coordinating the activities of the two, he is a logical member of the American Society of Tool Engineers, and can do his part to weld together the manufacturing industry so that it functions efficiently.

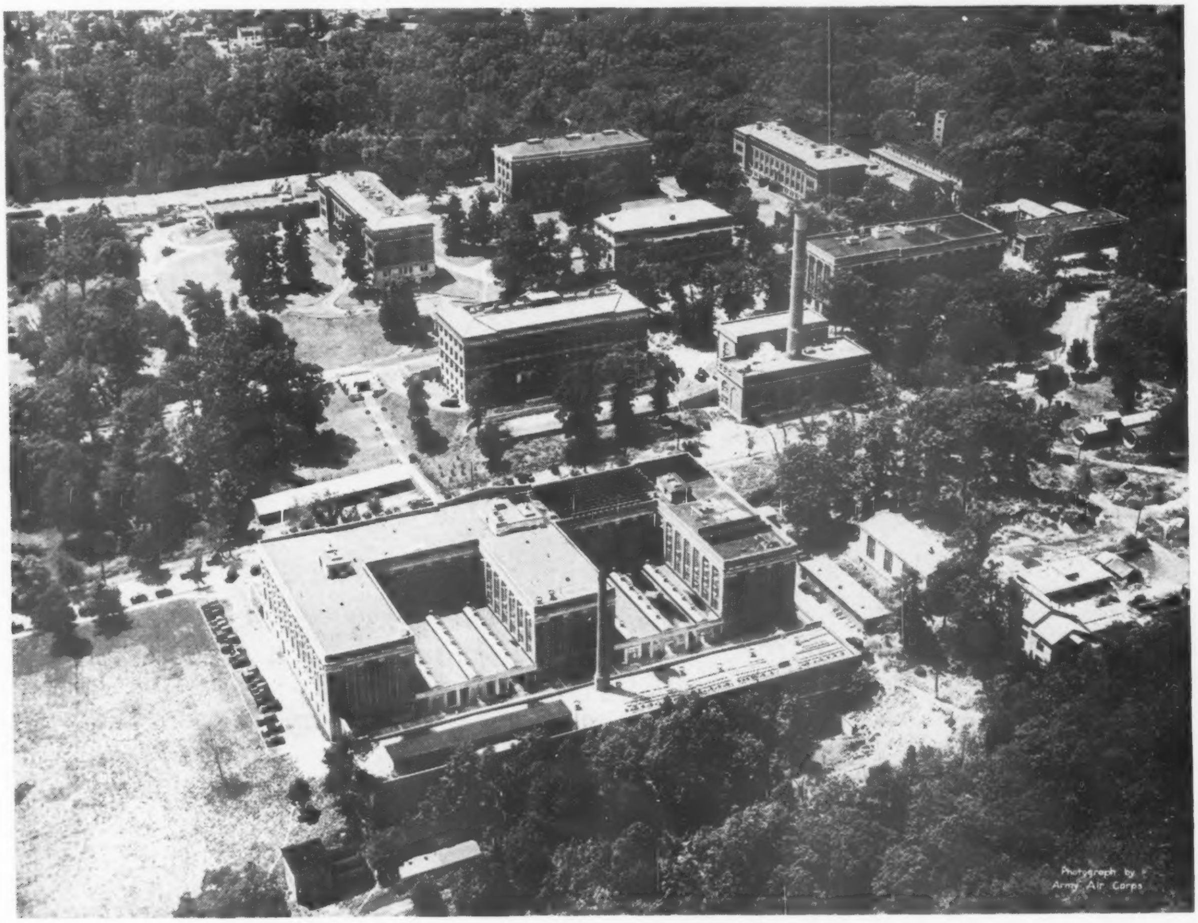
It is doubtful whether the average member who has not yet served on a committee or held an office in The Society realizes how much time and thought those at the helm devote to the planning of the monthly meetings, outings, dances, frolics, golf tournaments, director's meetings, the formation of new chapters, the compilation of standards books, the soliciting of new members and the checking of their qualifications, formulating by-laws, editing *The Tool Engineer*, nominating officers, and caring for the general welfare of all members.

Faith in human nature is restored when we consider that with not one cent being paid from the treasury of The Society in wages or salary it already has a very representative portion of the Tool Engineering profession, the ablest in the field of production, enthusiastically giving of their knowledge and ability, *for the good of all.*

CERTIFICATION of MASTER GAGES by the NATIONAL BUREAU of STANDARDS

FROM the time that the Bureau of Standards was organized in 1901 the Division of Weights and Measures each year has tested and standardized precision length standards and measuring instruments for the several branches of the Federal Government and for industrial concerns. By 1916 the work of testing contact length standards, micrometers, and screw thread gages, was sufficient to keep two men constantly occupied.

As accurate gages are a vital necessity in the manufacture of munitions this work was expanded to a large degree in 1917 in order to provide for the many demands of the War and Navy Departments and by manufacturers having contracts for war material. This led to the organization of a new section within the Division of Weights and Measures which is now well known throughout mechanical industry as the Gage Section of the National Bureau of Standards. The first appropriation for gage standardization was granted by Congress on June 15, 1917, and subsequently appropriations have been made annually for this work, which was continued in considerable volume as the result of increased use of the Bureau's facilities by industry and the government. In the year ending June 30, 1918, there were tested and certified or rejected 27,865 gages, of which 85% were for the United States Army. Of the total, 60% were classed as plain gages (plain plug, ring, and snap gages), 20% as profile gages (complicated templets, chamber gages,



Airplane view of the buildings of the Bureau of Standards, Washington, D. C.

and fixture gages), and about 20% as screw thread gages. In the next year the number of gages tested increased to 40,630, of which a much larger proportion, 45%, were screw thread gages. Since then the testing of screw thread gages has continued to be a major activity of the Gage Section. To expedite this large volume of testing there were, in addition to the laboratory at headquarters, three branch gage-testing laboratories, which were located in New York City; Cleveland, Ohio; and Bridgeport, Conn. These branches were discontinued after the end of the war.

United States Leads World in Mass Production

However, as stated in the Annual Report of the Bureau for the year ending June 30, 1920, "the need for gages and gage inspection did not cease with the ending of the war. Wherever interchangeable manufacture is carried on limit gages are needed, and the adequacy of the gaging system employed may be taken as a fair measure of the success attained in interchangeable manufacture. One of the principal reasons why the United States leads the world in the manufacture of automobiles, typewriters, machine tools, and other machine products is that manufacturers in this country have more nearly grasped the importance of gaging in interchangeable manufacture. It has been said that the wonderful production records made by our manufacturers during the war were due in a large measure to the fact that the United States Government insisted upon the proper use of gages. The use of gages is no less important in peace than in war and should be encouraged and fostered in every possible way."

Representative examples of the importance of limit gages in interchangeable manufacture are these: The production and inspection of the Springfield Army rifle requires the use of 1263 gages; a machine gun about 2200 gages; and one make of automobile about 15,000 gages. The Ordnance Department of the War Department has under its Charge in the various Arsenals more than 500,000 gages, the replacement value of which is about $30,000,000.

LYMAN J. BRIGGS
Director of the National Bureau of Standards.

Same Ultimate Standards—Essential

It is obvious that the most effective use of gages by industry can be secured only if all manufacturers and users of gages have access to the same ultimate standards. This object is promoted by the testing and certification of gages by the Bureau. For such services fees are charged to cover the cost of the work, which are covered into the Federal treasury. That industry has found this service to be of real value is shown by the fact that the variety of gages and mechanical parts tested by the Bureau has continued to increase since the War, and the volume of work to remain comparatively steady at about 3000 items per year. There was an increased tendency on the part of manufacturers to require careful inspection of certain gages and tools which formerly were accepted without any question as to accuracy. An early example of this tendency was the requirement for increased accuracy in gear hobs. Manufacturers of gears by the hobbing process began to feel the effects of keen competition with gears made by other processes, especially ground gears, and in attempting to improve the quality of their product they were inclined to require a rigid inspection of the hobs used. There was also a tendency to reduce the tolerances on gages used to inspect work, which in turn increased the difficulty of determining whether a particular gage was within the tolerance specified. Accordingly, one of the first steps taken when permanent quarters were made available to the Gage Section was to install an insulated and thermostatically controlled constant temperature room to be used exclusively in gage testing. There also began a progressive improvement in the accuracy of the equipment used for measurement of gages.

Master gages which the Bureau has tested and certified include precision gage blocks used by gage manufacturers and others as standards; master gages for interchangeable ground glass joints, stopcocks, and stoppers; and wires for measuring pitch diameters of screw thread gages. For more than ten years the Bureau has cooperated with the American Petroleum Institute to establish standards for oil-well casing threads and other screw threads for oil-field equipment by measuring and certifying master plug and ring thread gages made to represent the standards adopted. The Bureau is custodian of the sets of grand master gages. Three sets of regional masters are deposited at convenient stations which are used to check inspection gages, and which are rechecked periodically by the Bureau. Thus uniformity and complete interchangeability of such threads is secured throughout the country.

One of the functions of the Gage Section is to act as referee in disputes between manufacturers and purchasers of gages as to the acceptability of gages in question. The section is also called upon to an increasing extent to determine dimensions of parts of scientific apparatus such as penetration needles for determining consistency of bituminous materials, and polariscope tubes, of which hundreds of items have been tested in one year.

The certification of gages constitutes only a part of the work of the Gage Section. As indicated above, much work has been done in the development and improvement of test methods and apparatus. The Section has been of considerable assistance to standardizing bodies such as the National Screw Thread Commission and various Sectional Committees organized under the procedure of the American Standards Association. It has conducted or assisted in a number of technical investigations which have provided data necessary for various standardization projects dealing with mechanical parts, screw threads and threaded products and gages, and for preparation of Federal or Departmental specifications for such items.*

* *As of April 12, 1935, so far as* THE TOOL ENGINEER *was able to ascertain, the following firms manufacture and sell gages made to specifications as recommended by the American Gage Design Committee and adopted by the Bureau of Standards as defined and specified in Government document "Commercial Standard CS8-33." John Bath Co., Brown & Sharpe, J. M. Carpenter Tap & Die Co., Detroit Tap & Tool Co., Greenfield Tap & Die Co., Hansen & Whitney Co., Lincoln Park Tool & Gage Co., Pratt & Whitney, R & M Mfg. Co., Sheffield Gage Corp., Standard Gage Co., Swedish Gage Company of America, Taft-Pierce Mfg. Co. and Vinco Tool Company.*

A PRACTICAL TALK
on the
MACHINABILITY OF METALS

by **A. H. d'Arcambal**

Before one of the most enthusiastic and well attended meetings of the past year, Mr. A. H. d'Arcambal, of the Pratt & Whitney Company, Hartford, Connecticut addressed members and guests of the American Society of Tool Engineers in Detroit on April 11th, as follows:

Mr. President, members of the American Society of Tool Engineers and guests:

During the past year it has been my privilege to visit a large number of industrial plants throughout the country and have been pleased to note that the majority of these plants are putting their houses in order. Obsolete and worn-out machinery is being replaced with modern and more efficient machine tool equipment. Older types of heat treating furnaces are being rapidly supplanted by modern fuel-fired and electrically heated furnaces with automatic temperature control, atmospheric control etc. Some of the newer cutting materials are being introduced with marked success on many important operations. Freer machining alloy steels with better physcical properties are rapidly supplanting some of the older types of steels. Metal cutting tools of recent design are being used to marked advantage as compared with tools sold to the trade just a short period ago. These plants that have gone to the expense of modernizing their equipment, as well as making the other changes above noted, are in a splendid position today to turn out a quality product on a satisfactory price basis.

One of the most important factors affecting production in metal-working plants is that of the machinability of the material being fabricated. Tonight we will discuss in a practical manner the more important factors affecting machinability and then present a few interesting lantern slides and specimens.

Four of the most important factors governing machinability are the following: 1. Type and condition of machine tools employed. 2. Quality of cutting tools used. 3. Material being fabricated. 4. Cutting oils or cutting fluids employed.

Vast strides have been made during the past few years in regard to design of machine tools. All important working parts of modern machine tools are today made from the very best grade of steels offered the trade, heat treated alloy steels being liberally employed. Modern machines are heavier and have larger motors than the machines of a decade ago. Hydraulic feeds are being used to good advantage on certain types of machine tool equipment. Important parts are being held to much closer tolerances than was foremrly the case. Improved mechanical controls are noted on today's equipment. Many plants have learned the economy of replacing obsolete equipment with modern machinery due not only to greatly increased production but also to a more accurafe product being turned out.

The second factor affecting machinability is the quality of the cutting tools or what is commonly known as "small tools" employed. The very best of machine tool equipment will not function satisfactorily unless properly designed tools made from a good quality of steel and correctly hardened are used. I am pleased to state that the more progressive concerns in this country are today purchasing their cutting tools on a quality basis rather than strictly on a price basis as was the case a few years ago, thus effecting a marked economy in their tool costs.

The three factors that govern the quality of metal cutting tools such as taps, dies, reamers, cutters, hobs, etc., are the following: 1. Design. 2. Quality of steel employed. 3. Hardening treatment.

It will be noted that two of these three factors, namely, steel and treatment, are subject to metallurgical control, hence the desirability of a well equipped and operated metallurgical department in plants manufacturing metal cutting tools.

At this point it might be of interest to mention a few of the more interesting cutting metals and tool steels developed during the past few years. Without a doubt, cemented tungsten and tantalum carbides represent the most important contribution to the art of cutting metals during the past decade. The majority of you gentlemen are familiar with the composition and method of producing these cemented carbides so will not take time to go into

(Continued on page 22)

Milling the threads on an aircraft steel cylinder sleeve.

NEW OFFICERS INSTALLED AT APRIL MEETING

NEWLY elected officers of the American Society of Tool Engineers were installed at the regular April monthly meeting held at the Fort Shelby Hotel in Detroit. Each of these officers is pictured below with a brief personal history. They need no further introduction to the membership, as all are very well known. Each of these men outlined the parts they intend to play in the future of The Society for the next year. These instructive and inspirational talks will be given in the next issue of *The Tool Engineer,* as lack of space in this special issue of the publication prevents giving the full report herein.

ROBERT M. LIPPARD
President

At the helm of A.S.T.E. destinies for the ensuing year is our good friend, affectionately known as "Bob" Robert M. Lippard, who has been connected with the tool, gage and machinery industry for thirty years. Mr. Lippard, judging from his genial smile and interest at installation ceremonies, welcomes his opportunity to serve in the capacity of President for the Society.

No better fitted man could be found to serve the Society in the capacity of an Officer for Bob knows the tool engineering profession from the ground up. He served his apprenticeship in the caerly days with General Electric. Then, as tool maker in various plants throughout the East, he equipped himself unmistakably for the prictical, sound sales engineer and counselor he is today.

At present Bob is Branch Manager in Detroit for the Heald Machine Company of Worcester, Massachusetts.

Ford R. Lamb is the newly elected First Vice President. Mr. Lamb has served the Society in many ways since its inception. He has served as chairman of the important Publications Committee, which was responsible for the publication of the Journal, during its first year.

Mr. Lamb is well known as a tool engineer particularly in the automotive industry. He has worked on production, tool making, tool designing and production engineering. While connected with the Studebaker Corporation, Mr. Lamb had charge of Mathematical Instruction of apprentices for five years. While in the employ of Studebaker Mr. Lamb was also assistant to the Production Engineer.

FORD R. LAMB
First Vice-President-Elect

Mr. Lamb is well known to many of our members for his invention of the Modern stud setter and at present is connected with the Modern Tool Works division of Consolidated Machine Tool Corporation in the capacity of Sales Engineer. He is known as a specialist in threading and stud-setting problems.

W. M. GRAY
Second Vice-President

William Maxwell Gray, the newly elected Second Vice President is a native of Detroit and received his early education there. In 1909 he entered his apprenticeship at the Cadillac Motor School of Applied Mechanics, graduating in 1912. From 1912-1914 he was connected with the Studebaker Corporation. From 1914-1924 he was with Timken Detroit Axle Company in the capacities of Tool Engineer, Chief Tool Designer and Assistant Master Mechanic. In 1924 he joined the Clark Cutter Company as Chief Engineer. In 1925-1926 he was Assistant Master Mechanic with the Nizer-Kelvinator Corp. In 1927 Mr. Gray was connected with H. R. Krueger Company on special machinery until 1933. Since 1933 he has been connected with the Congress Tool & Die Company of Detroit.

ALBERT "AL" M. SARGENT
Secretary-Elect

Albert "Al" Marden Sargent, our secretary since the organization of the Society is re-elected. Al makes a good Secretary, as members know, and we are fortunate to have him accept the office for another term. The duties of the Secretary are many, varied and often irksome. Mr. Sargent deserves much credit for the splendid manner in which he has handled the affairs of this office. As the Secretary, his office is virtually a clearing house for information of all kinds pertaining to the Society, and he is often very helpful to members in ascertaniing certain facts as related to the Tool Engineering profession.

Mr. Sargent, is President and General Manager of the Pioneer Engineering & Manufacturing Company. Prior to organizing this, his own company, he had a widespread experience as tool and die maker and designer, grinding department superintendent, Chief Engineer, Assistant Superintendent experimental department, plant engineer, Vice President in charge of Engineering and General Manager of a machine manufacturing company.

Members may reach him at his office 31 Melbourne Ave., Detroit, MAdison 2057.

STANDARDS
and the
TOOL ENGINEER

★*by* **John Gaillard**
Mechanical Engineer
American Standards Association

ONCE a company has decided what the product should be, it is up to the tool engineer to determine the ways and means of manufacturing it. The product design is, for the time being, a "standard," formulated, so far as the tool engineer is concerned, in terms of dimensions, manufacturing tolerances, and quality of finish. On this he must base his tooling-up plan. He is to solve the problem of selecting machine tools, tools and accessories, such as jigs and fixtures, some of which have to be purchased, while others have to be designed. This problem is usually complicated by the question whether at least some of the existing equipment cannot be used (here the weight of existing "standards" comes in) and also by the requirement that the new equipment should be as adaptable as possible to future changes in the manufactured product. In other words, while closely fitted to the requirements of the present design "standard" for the product, his plan should also be flexible enough to follow readily a future revision. With this purpose in mind, the engineering department may call in the tool engineer while a new design is still being developed, as some features of the product may present problems from the viewpoint of tooling. Heeding his advice in this early stage will result in a better production design, and may save considerable expense. In this way, the tool engineer takes an active part in setting the "standard" for the product, trying to combine high quality with low manufacturing cost and maximum facility to change when the market demands it.

Obviously, this complicated task will be made easier by any factor that "stays put," or is "standard." For example, a number of component parts of the product will probably remain the same, when the design changes. Examples are simple elements like bolts, nuts and screws, and ball and roller bearings, made to generally accepted standards. Furthermore, the tool engineer benefits by standardization of the means he uses in carrying out his plan. For some machine tool elements and tools American Standards have already been set up. Examples are: T-Slots, Their Bolts, Nuts, Tongues and Cutters; Tool Holder Shanks and Tool Post Openings; Milling Cutters; Taps; and Rotating Air Cylinders and Adapters. Proposed American Standards for Self-Holding (Slow) Machine Tapers, and for Drill Bushings, are expected to come up for approval by the American Standards Association very shortly.

If the cylindrical fits between component parts of the product remain the same, in consecutive designs, the existing tools and gages may be used again. The problem of machine finishes reminds us of the fact that the tool engineer has a direct interest in the problem of specifying surface quality. He must know exactly what is wanted, if he is to choose the right kind of equipment. A committee organized under the procedure of the American Standards Association is now working on standards for the designation and classification of surface qualities. The A.S.T.E. is represented on it by Mr. Edward C. Lee, Chrysler Corporation.

It thus appears that the tool engineer's job is directly influenced by any standard, whether it applies to the product to be manufactured or to the means of manufacturing it. The tool engineer translates the production design into machining facilities. If what he is asked to tool up *for*, and also what he can tool up *with*, becomes "standard"—that is, remains stable for a certain period of time—his task is greatly simplified. The necessary flexibility can be conserved along with the stability in conditions. A striking practical example is the present trend in the machine tool field toward unit construction. This is one of the most interesting demonstrations of establishing standard practice—as embodied in a specific combination of units—with the thought in mind that a change in practice should be possible with a minimum of cost.

Obviously, the more generally a standard is adopted, the more effective it is. A series of American Standard coarse and fine screw threads resulted from a merger of standard ASME and SAE threads. Such unification benefitted the automotive industry, the machine tool builders, the railways, the manufacturers of apparatus, and in fact, every group manufacturing or using threaded products or threading equipment and tools. One of the main purposes of the American Standards Association is to bring together all groups interested in a standardization problem, so that they may jointly develop a unified proposal for an American Standard, acceptable to all. An interested group wishing to cooperate in such a development, may appoint a representative on the committee (or sometimes more than one), whether that group is affiliated with the ASA or not. As the A.S.T.E. now cooperates in one ASA committee, it is suggested that it may wish to be represented also on others, such as Small Tools and Machine Tool Elements.

Editor's Note: Interested readers of *The Tool Engineer* who are not fully acquainted with the American Standards Association and its activities, may secure a copy of a new Year Book, now being prepared. Write to the American Standards Association, 29 W. 39th Street, New York City or address *The Tool Engineer* for copies.

FOR ECONOMY AND LONG, DEPENDABLE ACCURACY---

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EXTREMELY HARD, LONG-LIFE

CARBOLOY CEMENTED CARBIDE

Being an extremely hard metal (ranging up to 92 Rockwell A) with an unusually high degree of resistance to both corrosive and abrasive wear, Carboloy cemented carbide finds wide application on many different types of gauges used in industry.

Carboloy cemented carbide can be used to advantage on any gauge on which you wish to increase the period of continuous, dependable accuracy. Its ability to stand up for long periods of continuous use is of particular value on gauges such as amplifiers, comparators, etc., used by unskilled labor for quantity inspection work. On these gauges, Carboloy-tipped indicator points insure long, dependable accuracy. In the field of automatic gauging, the use of Carboloy inserts on gagematic and sizematic gauges results in a reduction of costly down-time, a substantial decrease in scrap, and the production of more uniform parts.

In all cases the application of Carboloy cemented carbide to gauges is extremely simple: An insert of Carboloy, in any size or shape required, is brazed in at the gauging points and the gauge is then equipped for long, accurate service. The cost is higher than ordinary gauges, but you will usually find that longer life, less scrap, and more dependable accuracy offset the higher cost.

Write for full details, stating what types of gauges you are now using

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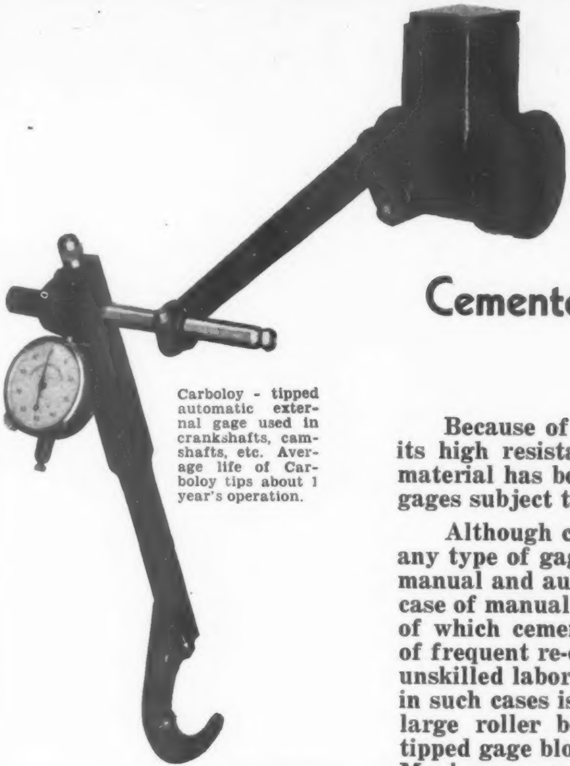

Carboloy - tipped automatic external gage used in crankshafts, camshafts, etc. Average life of Carboloy tips about 1 year's operation.

The Use of
Cemented Carbide Tipped Gages

by E. C. HOWELL

Carboloy Company, Inc., Detroit

Because of the extreme hardness of cemented carbide and its high resistance to both abrasive and corrosive wear, this material has been extensively applied in the form of inserts in gages subject to rapid wear.

Although cemented carbide can be used advantageously on any type of gage, its long life is particularly desirable on both manual and automatic gages used for production work. In the case of manual gaging, the long periods of dependable accuracy of which cemented carbide is capable, eliminate the necessity of frequent re-checks and insures efficient inspection even when unskilled labor is employed. An excellent example of the value in such cases is being currently demonstrated in the plant of a large roller bearing manufacturer. In this case, *Carboloy* tipped gage blocks are used to gage the type on roller bearings. Maximum wear allowed is .00005″. When using chrome-plated blocks, about 3 days was the maximum life and the full-time services of one man were required to recondition these blocks. Carboloy tipped blocks have been used for one year without servicing and are still on size. There are many other examples of such unusual life but the above serves as a good indication of the increased order of life which may be expected with cemented carbide.

This cemented carbide tipped plug gage has gaged over 200,000 parts without measurable wear.

In the case of automatic gaging, as for example on the external and sizematic gages illustrated at the left, the use of cemented carbide results in a particularly high order of economy. It substantially reduces down-time for gage changes, decreases scrap and "rejects", and produces more uniform results in all cases where used. The performance record of the sizematic and external gages at the left indicate the advantages obtained. The external gage shown is used on camshafts, crankshafts, etc. Previous "hard metal" inserts on this type of gage did not stand up for economical periods. Diamonds also proved uneconomical due to crackage. The life of the cemented carbide tips now used average about one year of continuous operation. In the case of the sizematic gage, the life of cemented carbide reported by one manufacturer, was in the order of 30 to 1 over high speed steel.

Cemented carbide tipped sizematic gage. Life reported by a Detroit plant is 30:1 over steel gage.

The use of cemented carbide is not confined to the above examples alone. It is being used successfully on practically all types of gages, including plug gages, ring gages, comparators, amplifiers, dial gages, snap gages, micrometers, internal indicators, length gages, "V"-blocks, etc. In each case cemented carbide is employed in the form of inserts brazed into the gage at the point of wear. It is a simple economical method which amply pays for itself by increased gage life and a more uniform product.

WE OF THE GAGE INDUSTRY

• • •

by **Erik Aldeborgh**
President, Gage Manufacturers' Association

MANUFACTURERS today are recognizing more and more the importance of gages and gage applications in the scheme of modern civilization, and America stands foremost in the world in the mass production of high quality mechanized products, which have their use in modern society. Smoothly running automobiles, aeroplanes, refrigerators, even your washing machines—they all testify to the ability of American manufacturers to carry on mass production and yet combine this tremendous production with quality of performance and reasonable economy.

Too much emphasis cannot be placed on these simple facts about American production. We have become so accumtomed to high calibre performance in mechanized products that we take it more or less as a matter of course, although we do appreciate the silent power which performs for us. The gage industry plays its part behind the scenes, and to the layman it may not be a very interesting subject unless trouble or some other circumstance excites his curiosity in that direction. The average person looks for accuracy of performance, but to us of the gage industry it is imperative that we be right, that we look for the highest precision possible, never losing sight of the fact, however, that we can improve our product. Science will make new discoveries and we, in America, are constantly going ahead with new instruments of precision.

Greater accuracy, higher precision—these vital factors must go hand in hand with sound and economic production. How well we generally realize these things, and yet even today, behind the scenes, where we are always striving for perfection, we of the family of gage makers and gage methods are not receiving full recognition. Millions of dollars' worth of products have gone to the scrap pile because of the failure of manufacturers to apply the proper gaging methods for interchangeable parts.

Indeed, there are cases even today where manufacturers have neglected to provide themselves with proper gaging methods until they have been forced to do so! What tremendous losses have been suffered, what headaches the manufacturers have had all because proper gaging methods were not applied for component parts. That carload came back after it was too late.

Mass production calls for speed in turning out the product whatever it may be. The ultimate buyer will not stand for a defective product and we must all work together to strive toward perfection. In this connection, the part played by the huge army of inspectors must receive full recognition.

To us of the gage making industry the inspectors are highly important members of our family. Given the gages and gage methods to work with, the inspectors can perform their highly significant service with the rapid turnover demanded. Where would we be without them in mass production? How well they, like we gage makers, know that one ten thousandth part of an inch is a foot! Even today they hear the word passed down: "Let her go, we can't stop now!" How true such a situation can be, and how true it is that this desire to get by may prove disastrous, whereas if the manufacturer had been forearmed with proper gaging methods and gaging applications he would have been saved this nightmare of despair.

We have suggested the importance of accuracy and precision as going hand in hand with economy of production. Gage makers today are making constant changes with the idea of improving their product and at the same time helping out in the business of economy. We believe that the gage industry in this country has done more for the manufacturer in the standardization of conventional type gages than any other similar industry in the world. Great advances have been made in long life gages, and these the manufacturer of interchangeable part products is more and more recognizing as of vital consequence in cutting down costs.

In these days of keen competition, it should be apparent that the manufacturers cannot long afford to be without the service of the modern gages and gaging methods. We must all go forward to keep abreast with the demands of civilization, and America to keep its place in the sun must make further strides toward perfection.

ENGINEERED PRODUCTION

EXAMPLES FROM THE SUNDSTRAND FILES

No. 3512

Lathes
Milling Machines
Tool Grinders
Centering Machines
Balancing Tools

A New and Novel Rigidmil

Sundstrand Machine Tool Co. has recently developed a Rigidmil, having a number of novel features and advantages, for machining 7 pads on the automobile cylinder blocks shown in Fig. 1. Three of these pads are indicated at A, B, and C; three more are on the opposite side, and the seventh is indicated at D.

For greatest convenience in handling work as it comes from the conveyor line two hardened steel strips, shown in the center foreground Fig. 2, are provided at the operator's position. From these strips, the block is moved into position shown in Fig. 2 where it is supported by a hydraulically operated elevator and located against swinging stops. Operator then opens a conveniently placed valve which applies hydraulic power to lower the work-piece onto hardened rest pads and accurate locating pins in a fixture secured to the Rigidmil table, and to clamp it securely. Now a second valve is opened to start the automatic machining cycle. These two valves are interlocked so that milling cannot begin unless the work-piece is accurately located and solidly clamped.

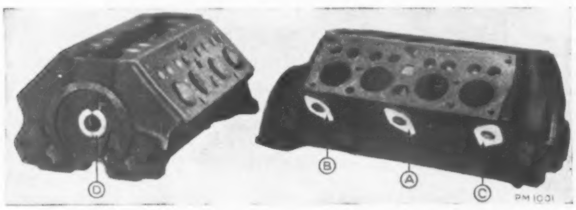

Fig. 1—8-cylinder block on which 7 surfaces are machined.

Rigidmil with work-piece in position ready for machining is shown in Fig. 3. Two cutters on rigidly supported angular spindles machine pads on both sides of the block simultaneously. At beginning of automatic cycle one cutter is between pads A and C, the other being between corresponding pads on the opposite side. Table feeds to right while center pads are milled simultaneously. Then table rapid traverses to right until pad B and a corresponding surface on the opposite side of the block are in position for machining. This completed, table rapid traverses to left for machining pad C and its mate on the opposite side. As this nears completion, left end of the work-piece approaches a horizontal spindle having a spot-facing cutter for machining surface D (See Fig. 1), slows to feed of ½" a minute for spot-facing, dwells briefly for fine accurate finish, then rapidly returns to starting position and stops automatically. Operator now moves elevator valve, work-piece rises until level with hardened steel rails on opposite side of machine, is pushed out by incoming cylinder block and then moved onto shop conveyor.

Fig. 2—8-cylinder motor block in position to be placed on fixture and clamped in position by hydraulic elevator.

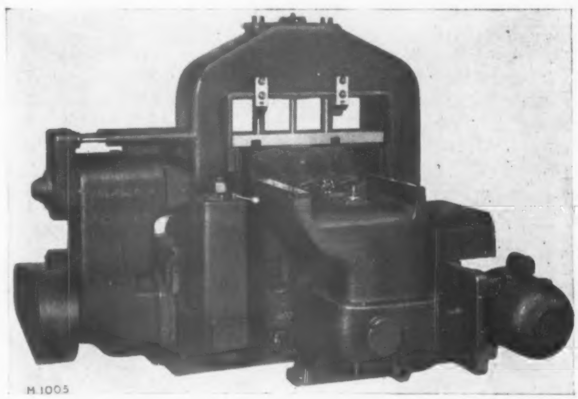

Fig. 3—New and novel Rigidmil with hydraulic work-handling and automatic table cycle for machining cylinder block shown in Fig. 1.

This Rigidmil is "tailor-made" to meet the customer's requirements. It has exceedingly convenient centralized controls; neat, reliable application of hydraulic power for work-handling, table feeds,, and rapid traverse. It has forced feed circulation of filtered lubricating oil, completely enclosed drive mounted on anti-friction bearings, is fast, accurate, powerful, and durable.

Sundstrand Rigidmils either standard or built-to-order are lowering costs, increasing production, and improving quality on a wide variety of milling operations—ask us about them.

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this matter in detail this evening. It is only a few years ago that cemented tungsten carbide was offered the trade at a price in the neighborhood of $450 per pound or a dollar a gram, but unfortunately it was recommended for all types of jobs where high speed steel was formerly employed. Tools tipped with tungsten carbide failed after very short service on practically all steel jobs, as well as some of the softer metals, due to improper rake angles, etc., because of the extreme brittleness of this very hard cutting metal. A further study by the concerns producing carbides, however, resulted in these tools giving phenomenal service when used on non-metallic materials, extremely satisfactory service when used on the non-ferrous metals, as well as some gray iron jobs, but most unsatisfactory service on the majority of the steel jobs. At a slightly later date tantalum carbide and only recently, titanium carbide, were introduced, very satisfactory results being obtained on steel jobs, especially when using the tantalum carbide mixture. The steel chips do not seem to weld back of the cutting edge on the tantalum carbide group as is the case on tungsten carbide, resulting in a much more satisfactory life. Several of the larger automotive companies in your district are today using tungsten and tantalum carbide tipped tools in large quantities with a very marked savings in their tool costs. The cemented carbides being produced today are very much superior in quality to the carbides offered the trade three or four years ago, the price today being considerably more attractive than that asked a couple of years ago.

H. S. Bar Stock Fracture

H. S. Forging Fracture

Microstructure Mag.x 100 of a section cut from a 5" diameter annealed H. S. Steel bar stock disc. Note segregation of carbides.

Microstructure Mag.x 100 of a section cut from a 5" diameter H. S. forging in annealed condition. Note uniform distribution of carbides and tungstides.

The Carboloy Company recently introduced their No. 548 metal to the trade, this being a cobalt, tungsten, iron alloy with small amounts of molybdenum, vanadium and 20% maximum carbon. This interesting cutting metal as received by the trade has been given a preliminary heat treatment in the neighborhood of 2250° Fahr. by the mill before shipping, with the resultant Rockwell hardness in the neighborhood of C 40 to 45. Cutting tools to be made of this material are machined to finish dimensions without any great amount of difficulty and then hardened by merely heating to 1050° to 1100° F. and air cooled, with resultant Rockwell hardness in the neighborhood of C 66-67. This practically carbon free cutting material hardens by what is known as precipitation hardening, the low temperature employed resulting in practically no size change during the hardening operation. Splendid results have been obtained at times from cutting tools made of this No. 548 alloy although it has not run very uniform in regard to performance. A careful study as to the proper method of manufacture, treatment, etc., is now being carefully conducted, resulting undoubtedly in this material occupying an important position among the list of cutting materials at an early date. It is our understanding that this new alloy will sell at a price in the neighborhood of $4.00 per pound.

Stellite has made important gains during the past few years in regard to cutting applications. A great many companies are using Stellite's "J" metal with marked success on different applications.

You have heard a great deal during the past three to four years in regard to chrome plated cutting tools, both carbon and high speed steel. It has been our experience in the large majority of cases, with the exception of chrome plated reamers used on some of the softer metals, that chrome plated tools such as taps, cutters, hobs, etc., do not perform any more satisfactorily than tools not plated. Two or three piston ring manufacturers specify chrome plated high speed steel screw slotting cutters as they have found that the fine cast iron dust will not weld to the sides of the saws properly plated as was the case with saws having merely the usual ground finish. This is the only application of chrome plate to cutters, however, that we have found to work out satisfactorily.

We have been questioned many times lately regarding nitrided high speed steel tools. Our company has been nitriding certain types of tools for over ten years, the applications, however, being quite limited due to the extreme brittleness of the nitrided surface. Quite often threaded tools properly nitrided will fail after short service due to chipping or breaking of the threads but we have worked out certain applications of threaded tools where the nitrided product proves most satisfactory.

In regard to some of the newer types of high speed steels, we are at the present time quite interested in the higher vanadium type of high speed steel, this material having the following approximate composition: Carbon .80%, Chromium 4.00%, Vanadium 2.10%, Tungsten 19.00%, Molybdenum .60%.

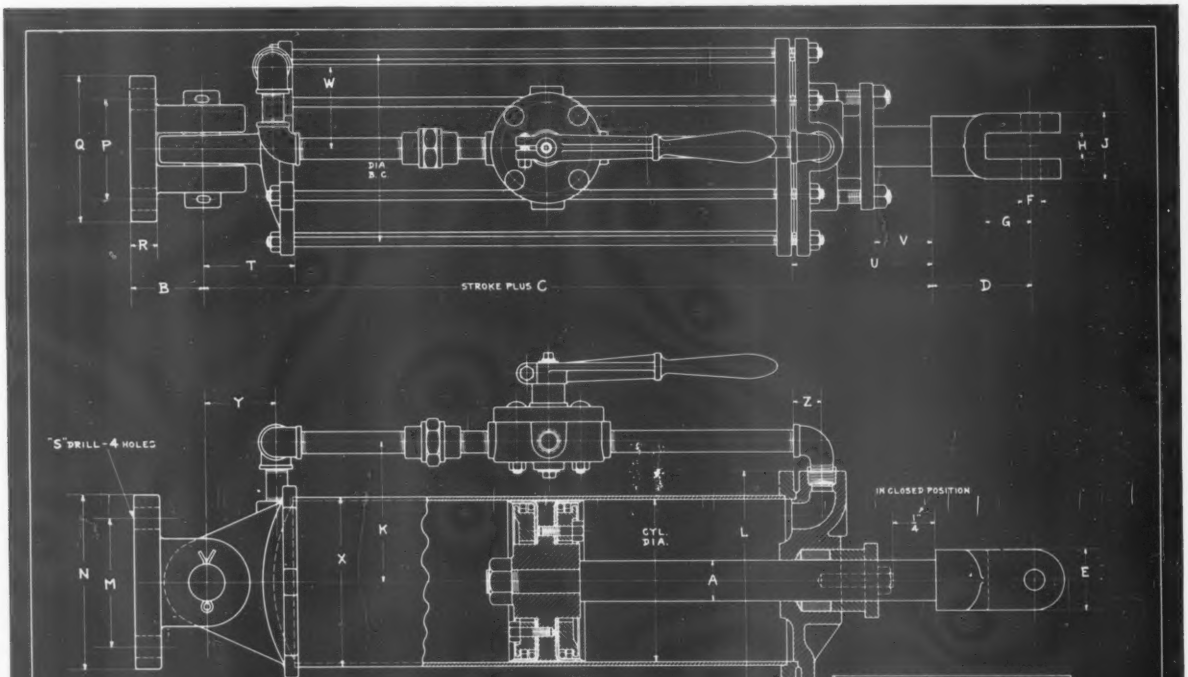
(Continued on page 24.)

HANNA CYLINDER WITH PIVOT MOUNTING

LOW FIRST COST, COMPACTNESS AND ECONOMY OF OPERATION OF HANNA CYLINDERS RECOMMEND THEM FOR OBTAINING ALL MANNER OF PUSH, PULL, LIFTING OR LOWERING MOTIONS. OVERLOADING SIMPLY STALLS THE CYLINDER CAUSING NO DAMAGE AND ITS DESIGN AND RUGGED CONSTRUCTION ASSURE FREEDOM FROM MAINTENANCE WORRIES.

HANNA CYLINDERS with pivot mounting as illustrated are suggested where the piston rod travel is not in a straight line. Several other styles are available with cylinder diameter and length of stroke to suit requirements. You can also design your own mounting facilities from dimension chart following:

RETAIN FOR FUTURE REFERENCE



CYLINDER DIAMETER	A	B	STROKE + "C"	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z	STRAIN RODS NUMBER	STRAIN RODS SIZE	STRAIN RODS DIA. B.C.
3"	3/4	2 1/2	9 7/8	2 3/4	1 1/2	5/8	1 1/2	3/4	1 3/4	4 1/8	5	3	4 1/2	3	4 1/2	7/8	9/16	3 1/8	3 1/2	3/4	on ℄	3 1/4	2 1/4	7/8	4	5/16	4
4"	3/4	2 1/2	10 3/16	2 3/4	1 1/2	5/8	1 1/2	3/4	1 3/4	4 5/8	6	3	4 1/2	3	4 1/2	7/8	9/16	3 3/8	3 1/2	3/4	on ℄	4 1/4	2 3/8	1 1/8	4	3/8	5
5"	1	2 1/2	10 13/16	2 3/4	1 1/2	5/8	1 1/2	3/4	1 3/4	5 1/8	7 1/2	3	4 1/2	3	4 1/2	7/8	9/16	3 7/8	3 1/2	3/4	on ℄	5 1/4	2 5/8	1 1/8	4	3/8	6 1/8
6"	1 1/2	2 3/4	11 5/16	3 1/4	2 1/4	3/4	1 3/4	1	2 1/2	5 5/8	8 1/8	3 3/4	5 1/2	4 3/4	6 1/2	1	13/16	3 3/8	4 1/4	7/8	3 1/16	6 1/4	2 5/8	1 1/8	6	3/8	7
7"	1 1/2	3 1/4	11 9/16	4 1/2	2 1/2	1	2	1 1/8	2 3/4	6 5/8	10 5/8	4	6	4	6	1	13/16	3 5/8	4 1/4	7/8	on ℄	8 1/8	1 1/8	1 1/8	6	1/2	9 1/16
8"	1 1/2	3 1/4	12 1/16	4 1/2	2 1/2	1	2	1 1/8	2 3/4	7 3/8	12	4	6	4	6	1	13/16	3 7/8	4 1/4	7/8	on ℄	9 1/16	1 1/8	1 3/8	6	1/2	10 1/4
10"	2	3 1/4	14 1/8	4 1/2	2 1/2	1 1/8	2	1 1/8	2 3/4	8 1/2	14 1/4	3 3/4	5 1/2	3 1/2	5 1/4	1	13/16	4 3/8	5 1/8	7/8	on ℄	11 1/4	1 3/8	1 3/4	8	1/2	12 1/4

OVERSIZE PISTON ROD DIMENSIONS

CYLINDER DIAMETER	A	STROKE + "C"	D	E	F	G	H	J	U	V
3"	1	10	2 3/4	1 1/2	5/8	1 1/2	3/4	1 3/4	3 5/8	3/4
4"	1 1/2	11 1/16	4 1/2	2 1/2	1	2	1 1/8	2 3/4	4 3/8	7/8
5"	2	12 3/8	4 1/2	2 1/2	1 1/8	2	1 1/8	2 3/4	5 1/16	7/8
6"	2	12 1/8	4 1/2	2 1/2	1 1/8	2	1 1/8	2 3/4	5 1/16	7/8
7"	2 3/4	12 7/8	6	3 1/2	1 1/2	3	1 1/2	3 3/4	5 3/16	1
8"	2 3/4	13 1/4	6	3 1/2	1 1/2	3	1 1/2	3 3/4	5 7/16	1
10"	2 3/4	14 1/2	6	3 1/2	1 1/2	3	1 1/2	3 3/4	5 1/2	1

HANNA ENGINEERING WORKS

Detroit Office—Telephone University 12232

1765 ELSTON AVE. - - - - - - - - - - CHICAGO, ILLINOIS

(Continued from page 22.)

Tools made of this high carbon, high vanadium high speed steel must be heated to a temperature 2380° Fahr. for proper solution of the carbides and tungstides. Certain types of cutting tools made of this high vanadium high speed steel give longer life between grinds on certain operations but here again we have found the use of this material more or less limited due to the fact that it does not posses as high degree of toughness as the usual 18-4-1 type of high speed steel.

During the past few months you have heard and read a great deal about molybdenum tungsten high speed steel this material containing about 80% molybdenum and 20% tungsten, instead of the usual 18% tungsten type. Tools made of this molybdenum, tungsten steel are properly hardened at a temperature in the neighborhood of 2175° Fahr., as compared with the usual 2350° F. treatment recommended for the standard 18-4-1 type. These tools therefore are somewhat tougher than tools made of the 18-4-1 type of high speed steel. The disadvantage of this material is the fact that it cannot be hardened by the usual open-fire method without producing a very deep soft skin due to the volatilization of the molybdenum oxide. This soft skin effect can be minimized or entirely eliminated, however, through either covering the tools with borax after the pre-heating operation or else treating the tools in a salt bath furnace. I believe that there is a field for molybdenum tungsten high speed steel especially in the case of emergency such as war when our supply of tungsten is liable to be cut off. Despite all the new cutting metals introduced during the last few years, I am of the firm opinion that for many years to come the majority of high speed steel cutting tools will be made of the 18-4-1 type of steel, the newer types of high speed steel and cutting materials introduced from time to time finding special applications.

The third factor governing machinability is that of the material being fabricated. High sulphur Bessemer screw stock is the freest machining steel offered the trade today. Next in line comes ordinary Bessemer screw stock known as S.A.E. 1112, followed by the high sulphur open-hearth steels of low and medium carbon content, these steels running in the neighborhood of 1% manganese. The old type of machinery steels known as S.A.E. 1020 and 1045 have been rapidly supplanted with some of these newer types of free-machining steels with improved physical properties.

In regard to the medium carbon alloy steels, it is now generally agreed that molybdenum bearing steels are somewhat freer machining, especially in the higher Brinell ranges than are the medium carbon alloy steels without molybdenum. We are at the present time conducting tests on various types of medium carbon alloy steels in regard to machinability, this work to be completed at an early date.

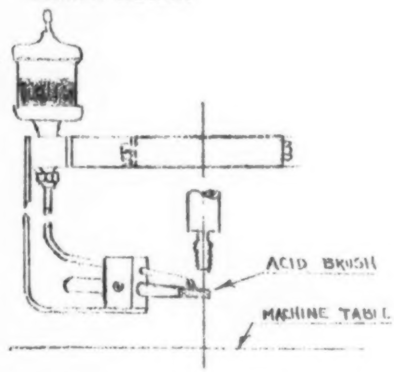
Up to a few years ago the ordinary run of stainless steels were very difficult to machine but the introduction of so-called free machining stainless steels with satisfactory corrosion resisting properties has helped solve this problem to a great extent. There is an increased demand today for these free-machining stainless steels.

The fourth factor mentioned during the first part of this talk and one of the most important factors, refers to the type of cutting oil or cutting fluid employed. Some twenty years ago a mineral lard oil combination was quite widely used in metal working plants although some operators preferred pure lard oil, others soluble oils, etc. During my employment at Dodge Brothers in 1916 or 1917 we ran across a sulphur base oil or black oil known in those days as T. O. P. cutting oil. This oil proved to be very efficient when used on threading operations, as well as some other types of machine jobs, rapidly supplanting the minimum lard oil used so commonly at that time. Today one finds that the majority of metal working plants are using sulphur base oils of various types with extremely satisfactory results on such operations as threading, milling, reaming, etc., soluble oil or base mixed with around 20 to 30 parts of water being used for the ordinary run of production turning jobs, etc. In a great many cases the life of cutting tools or finish obtained on the work can be bettered through the use of the proper type of cutting fluids or cutting oils, not forgetting that the proper flow of oil is of importance as well as the type of cutting fluid being used. Should you be experiencing maching troubles in your plant do not blame the material being fabricated or the cutting tools until you have made certain that the type of cutting oil employed is of satisfactory composition.

Lantern slides showing developments in machine tool design, an all-electric hardening department, chrome plating department, photomicrographs illustrating the effect of grain size on machinability, etc., were then shown and carefully explained. After the slides, interesting machining examples, as well as various types of cutting tools were displayed.

Automatic Oiler For Tapping

By Robert Lindgren
Member A.S.T.E.



A very simple method of getting oil to the tap, in a majority of tapping operations, can be provided inexpensively, as illustrated.

A large glass body drip oil cup is provided with a coupling with copper tube attached. The oil is carried from the cup through the copper tube to an acid brush which is fastened to a bracket in such a position that the tap will pass through the bristles of the brush before entering the hole.

The mounting of this oiler can be varied to suit different needs. The oiler illustrated was found to be very satisfactory on a job that required no fixture.

Whenever production warrants, this oiler can be used to good advantage as a labor saving device.

Left—The great importance of a standard temperature in measuring is illustrated by the fact that a variataion of only one degree Centigrade will change the indicated length of a one-inch steel block between .000011" and .000012".

INDUSTRIES OF WORLD ADOPT UNIVERSAL FOUNDATION for FINE MEASUREMENTS*

*"Peace hath her victories
No less renown'd than war."*

WHILE all the world was reading under big black headlines the other day that the governments of France and Great Britain had come to an agreement regarding German rearmament, another, and unheralded, international agreement in which those powers and the United States are deeply concerned was being reached—one that has at least as much interest for world-industrialists (and for world-physicists as much importance) as the Franco-British agreement had for world-politicians.

Announcement of the agreement came in the form of a letter to the Ford Motor Company from the Deutscher Normenausschuss (or German Standards Association) in which it was stated that the German association, following the lead of the American Standards Association, has accepted as a standard for reducing the inch to millimeters and the millimeter to inches the formula: 1 inch = 25.4 millimeters; also that Finland, Denmark, Sweden, Japan, and other countries cooperating with the International Standards Association have subscribed to the recommendations of the I. S. A. committees to publish calculation tables for the conversion of the inch to millimeters with the use of that formula.

* By permission of "Ford News."

And that is a victory not only for the American Standards Association but also very definitely for the Ford Motor Company, in whose Dearborn experimental laboratory C. E. Johansson has worked diligently to secure standardization of international measurement for industrial use. It is a "peace victory" because every nation on earth will profit from it.

The official acceptance of this standard of conversion from inches to millimeters and vice versa by the German body marks the final step in simplifying the standards of fine measurement throughout the civilized world and has the utmost importance for all world-manufacturers who, like the Ford

(Continued on page 27)

The snap gage shown above can now be used to measure a piston pin in either inches or millimeters.

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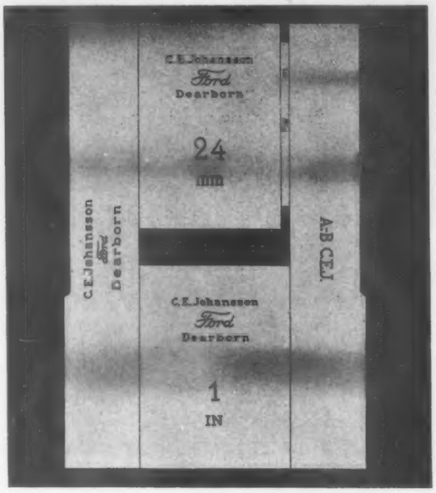
The blocks shown below are taken from different systems, that above from the metric and that below from the Johansson inch-measurements, but they represent interchangeable facters in world industry.



Motor Company, build their products both under the linear measure based on the inch and under the metric system.

The first step was taken by the Ford Motor Company several years ago when the interest of industrial leaders, scientists and manufacturers was enlisted in a movement to adopt a definite conversion factor that should be uniform throughout the world.

But there were obstacles, apart from international prejudices and preference in the matter of systems of measurement, even to that first step. France, Germany and other countries used the metrical system. England, Canada and the United States did their linear measuring in inches, feet and yards. The official British equivalent of one inch was 25.39998 mm; the American equivalent was 25.4005 mm. Moreover, different countries had different temperature standards—an all-important factor in fine measurement, since a variation of one degree Fahrenheit is sufficient measurably to change the length of a one-inch steel block. The British used 62° Fahrenheit; the French used 0° Centigrade (32° F.)

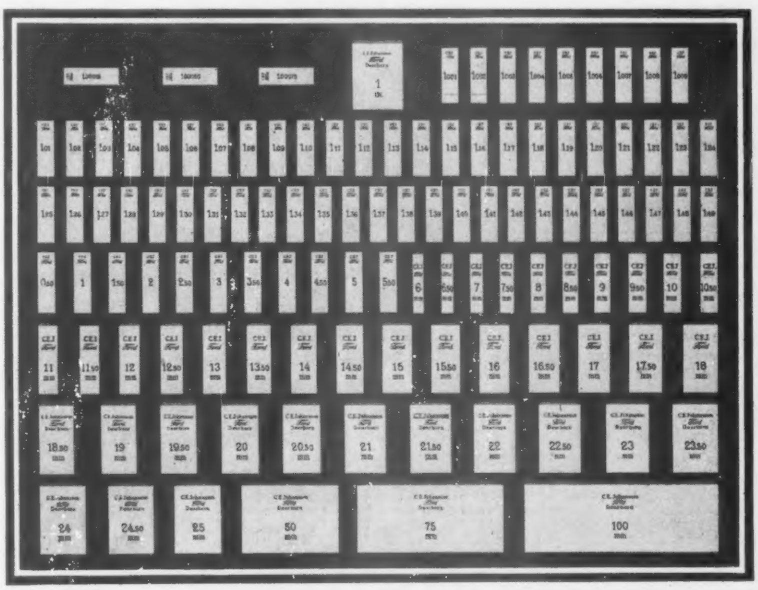
France, Germany and other countries used the metrical system. England, Canada and the United States did their linear measuring in inches, feet and yards. The official British

Mr. Johansson manufactured his gage blocks at a constant temperature of 68° Fahrenheit, and found that this temperature was most suitable for fine measurement, in that it was the mean temperature of most laboratories and shops, taking into consideration both different countries and seasons. 20° Centigrade compares also exactly with 68° Fehrenheit.

While these differences existed there could be no international interchange of precision instruments or measurements; and both France and England were reluctant to abandon their standards since any change would involve the alteration of their industrial gages. They nevertheless did so, and 68° Fahrenheit (20° C.) became standard throughout the world.

As a result of a conference of the International Committee of Weights and Measures held in France in 1929, France and other principal countries adopted 20° (68° F) for industrial measurements. A year later the British Standards Association followed suit and adopted morover the relation 1 inch = 25.4 mm. The American Standards Association, which had advocated the change for years, submitted the question to American Industry in 1932. The 25.4 conversion ratio was approved for industrial use, and the association published a series of conversion tables based on that standard.

The notification by Germany of her determination to use this standard and of its acceptance by countries cooperating with the international committee, means that an automobile, for instance, manufactures in this country under our system of linear measure will conform exactly in dimensions to a similar car manufactured under the metric measure in any other part of the world.



Millimeter set consisting of 114 blocks divided into five series. By combining them, measuring values are built up in consecutive steps of .00025mm. Set also contains one extra block in size 1 inch equal to the inch-millimeter factor. Like the inch set, this gives 1,000,000 dimensions or steps.

Letters from Members

Dear Sirs

In reply to your letter of March 21, I am receiving The Tool Engineer *regularly, and with pleasure.*

As you request, I will forward any items which may be of interest.

Thanking you for your letter, I am,

Very truly yours,

Louis Kasper,
517 Marwood Road
Philadelphia, Pa.

Dear Sirs

It was indeed a pleasant surprise to have received your letter this morning and I wish to assure you that any letter of this type telling me that I have not been forgotten by my old friends is most welcome.

I appreciate your thought and want to tell you that it struck a person who is very much interested in the doings of he Tool Engineers' Society, and is willing at any time to cooperate.

I am employed as a managing engineer in a factory manufacturing special sewing machines and we are employing about sixty people, specialists in varous branches of manufacture. The experience accumulated in Detroit during so many years there is very much appreciated around this part of the country, although the shop owners are very conservative and always believe that modern methods are expensive.

I hear of quite a number of Detroit boys holding high positions in industries in the Eastern part of this country, but I have had no chance to see them so far.

Cordially yours,

J. K. Wohlfeld,

New York City

Dear Sirs

As a charter member of the A.S.T.E, I feel highly honored and pleased to submit a short article that may be of interest to fellow members, and the mass production field.

Since leaving Detroit, August 14, 1933, I have been connected with the Modern Tool Works, a Division of the Consolidated Machine Tool Corporation of America, located at Rochester, New York, in the capacity of Chief Tool Engineer.

The Modern Tool Works manufactures small tools, and our line consists of Self Opening Dies, Solid Adjustable Dies, Collapsible Taps, Magic Chucks and Collets, Stud Setters, and Inserted Blade Face Milling Cutters.

Our development work is going ahead as fast as time will permit, and at present we are pleased to announce a brand new Stud Setter known as the Type "B" Stud Setter. With this new tool we can set studs tighter than ever before, it will set studs to a shoulder—an operation that was not possible with any other stud setter on the market—and this tool will also set studs to a predetermined height.. It is so free in action that it can be readily lifted off the stud at any time without marking the stud.

Sincerely yours,

John S. Bartek

Rochester, N. Y.

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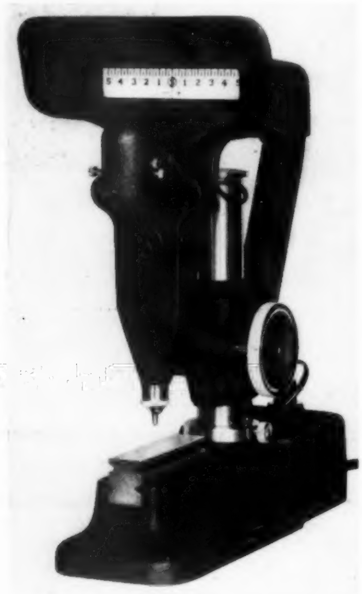
THIS MONTH'S COVER

THE NEW VISUAL GAGE

Until recently, selective assembly was the accepted practice in nearly all metal-working plants. However, within the last five years precision inspection, made practicable largely by the visual gage, has gradually superseded selective assembly.



In many plants of the automotive and refrigeration industries, especially, parts made in widely separated departments come together for final assembly accurately classified according to exact size. This classification is handled most rapidly and most economically by the visual gage.

The Visual gage produced by the Sheffield Gage Corporation of Dayton, Ohio, is both a rapid inspection gage for close tolerance production work and also a precision comparator by which fine work shop gages may be periodically checked.

A relative movement of 0.000025 inches between the anvils covers a space of 1/8" or one unit on the illuminated dial. A difference of 1/10000" in anvil setting moves the indicator 1/2" along its scale.

This 5000 to 1 magnification results from ingeniously obtaining mechanical and optical magnification, but in the Sheffield gage without resorting to any movable elements such as gears, pinions, levers or knife edges. Not a single element in the assembly of this gage head is subject to sliding friction. As a result, there is no opportunity for the gage to lose adjustment or become inaccurate due to wear.

The upper gaging element is diamond tipped to minimize all effects of wear. The lower anvil is furnished in two interchangeable types, one flat for the gaging of flat surfaces and outside cylindrical diameters; the other, of a mandrel type, for gaging internal diameters.

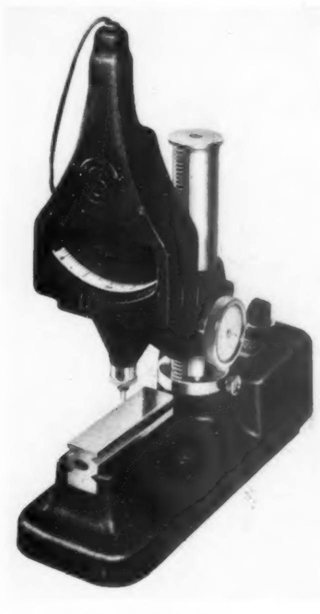
The flat anvil is made of Sheffield special steel, an alloy manufactured in selected steel plants where very close analysis is held. This steel, resulting from extensive metallurgical research and gage experience, is a metal having maximum density, uniformity, toughness and hardness.

When the gage is to be used for high production inspection as, for instance, on bearing rollers, piston pins, refrigerator parts, etc., a strip of tungsten carbide 1/2" wide is set in the flat surface of the anvil as an additional protection against wear.

The mandrel anvil for internal diameter gaging carries two strips of tungsten carbide properly spaced. These are set solidly in the mandrel with their surfaces slightly above its outside circumference. A lower contact consisting of a spherical tungsten carbide point is set in the end of a lever which actuates the diamond pointed upper gaging element. Thus all internal diameters are measured on a 3-point contact.

The gage head carrying the reed mechanism is readily moved up and down on a large diameter standard. The maximum range of travel is 6".

The gage is set by means of master measuring elements placed between the lower anvil and gaging element. The gaging element is brought approximately in position with a large thumb screw



at the right of the column. Final adjustment is then completed by moving the knurled nut on the spindle just above the diamond-tipped gaging element.

The visual gage can be used on any 110-volt A.C. 60-cycle current. A transformer is mounted in the base of the gage for stepping down the voltage to 8 volts. This current is used only for illuminating the reading dial.

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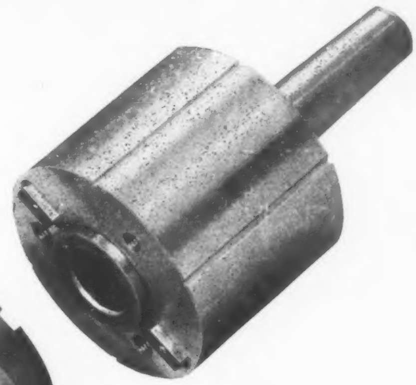

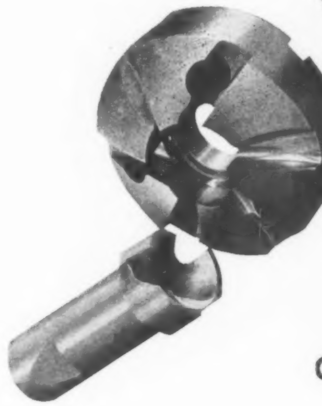

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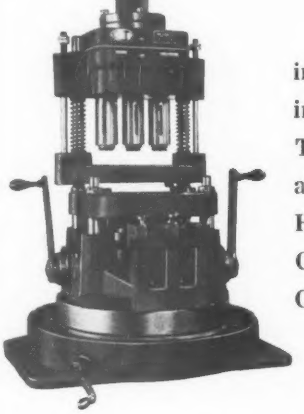

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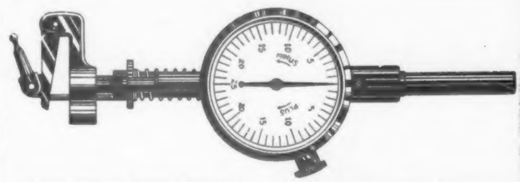

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